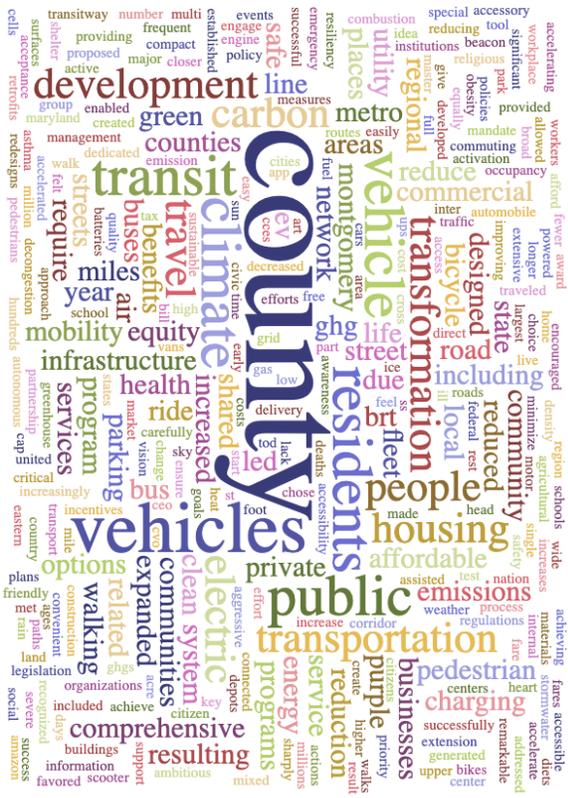


Montgomery County Sustainable Transportation Demand Management (TDM) Vision for 2035



It is January 1, 2035 and Montgomery County successfully achieved its ambitious goal of eliminating essentially all transportation related greenhouse gas (GHG) emissions generated from within the county.

The county's transportation emission reduction strategy had three key goals:

- 1) reduce single occupancy vehicle driving,
- 2) accelerate use of low emission vehicles, and
- 3) require climate-friendly development patterns.

This approach had two significant advantages over less comprehensive approaches. First, by adopting a mutually reinforcing portfolio of measures, the county minimized the risk of relying on any single approach, given the uncertainties surrounding costs, technologies, and market acceptance. Second, it enhanced quality of life by

improving equity, health, safety, climate resiliency, and community cohesion among other benefits.

Residents, workers, and visitors of all ages, incomes and physical capabilities, whether in town or upper county, enjoy a wide variety of accessible and carbon free mobility opportunities. The county has embraced the circular economy and incentivized the creation of green industries throughout the region and in the context of transit oriented development (TOD).

Many more residents and workers are now living and working in compact, walkable, vibrant green communities, increasingly in mixed-use higher density development or accessory dwelling units.

These communities allow residents easy local and regional accessibility whether by foot, bicycle, scooter, wheelchair or public transit. Accelerated construction of a comprehensive bicycle and pedestrian network, as envisioned in the Bicycle and Pedestrian master plans provide well over 1100 miles of safe, convenient, and often separated bicycle paths and pedestrian rights of ways. These pathways were carefully designed and maintained to help minimize the mobility difficulties resulting from increasingly severe weather.

Increased accessibility, including greater mobility choices along with carefully designed parking, road, and decongestion tax incentives and penalties, has led to significant decreases in the number of private vehicles, and the miles driven in these vehicles.

The county's comprehensive approach resulted in a "tipping point", in which only a smaller percentage of trips by county residents are now made using single occupancy vehicles (SOV) as an option of last resort. The remaining vehicles - private cars and sport utility vehicles, fleet, delivery, service, commuter and paratransit vans, trucks and buses - are now almost entirely powered by clean electricity, whether through batteries or fuel cells.

This reduction in private vehicles and their use has allowed the transformation of many public and private parking facilities (including large shopping malls) into mixed-use compact development featuring market and affordable housing, commercial and public uses, and generous green spaces.

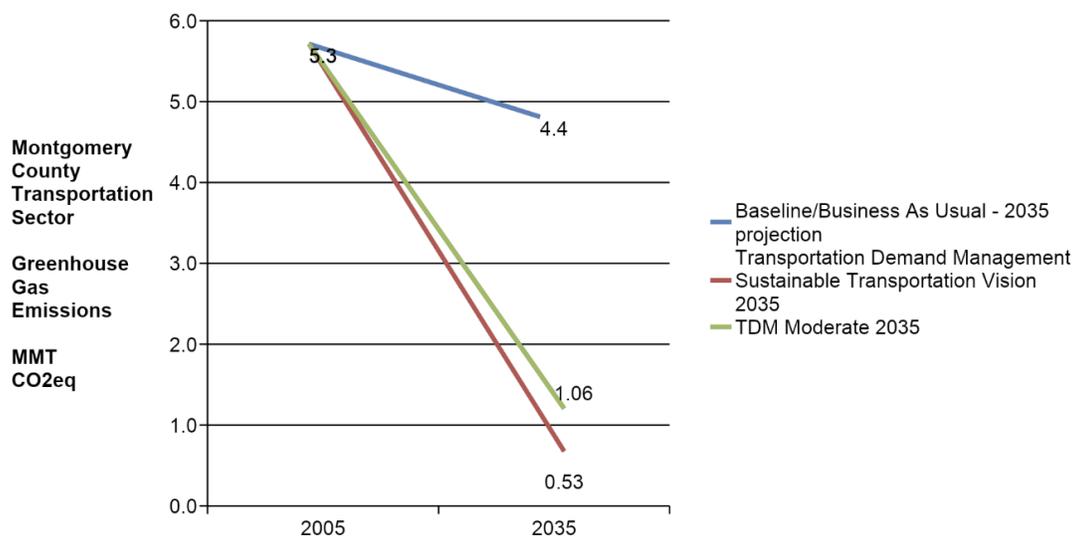
Transportation diversification and land use transformation resulted from a series of carefully designed public policies developed as part of the intensive public climate emergency planning process during 2019 and 2020.

This unprecedented public involvement effort engaged thousands of county residents from all areas and walks of life resulting in policy, investment and practice recommendations that took into account equity, inter-generational participation, and community transparency and sought to create healthy, resilient, and sustainable 'people-centric' communities as indicated by the 10 characteristics cited below:

1. More pedestrians as streets became welcoming places engage in community life
2. More people cycling and using public transport with policies that decreased car use and increased street safety
3. Better air quality that delivered health benefits and reduced health inequalities
4. More resident comfort given increased and safe walking and cycling options
5. Less noise from motor traffic directly benefited health and encouraged active travel
6. Better-designed crosswalks made streets easier to navigate and connected communities
7. More resting places encouraged mobility for certain residents and even benefited local businesses given the increased foot traffic
8. More sidewalk shade and shelter access points enabling everyone to use our streets, whatever the weather.
9. More relaxed communities as streets were buffered with green infrastructure, such as street trees and rain gardens
10. More connected communities as people became accustomed to interesting and stimulating pedestrian journeys with attractive buildings, plantings, and street art

GHG Emission Reduction Potential

Based on an [initial data analysis](#) conducted by the *Metrics & Data Evaluation* sub-group of the Transportation Technical Working Group, the potential GHG emission impact of the TDM Vision for 2035 results in a reduction of between 80-90% over 2005 levels.



One of the primary reasons for this drastic GHG reduction is because this TDM Vision focuses on the *movement of people from one destination to the next, and not the movement of cars*. By focusing on game-changing public transit, electric vehicle, infrastructure transformation, organizational and system change, public awareness, and affordable housing policies, the county incentivized a transportation modal mix that made a substantial GHG emission impact.

Each section forthwith provides more detailed concepts, which link to at least one of the 40 associated “action items” or projects within a [TDM spreadsheet](#) that provides peer best practices examples, implementation steps, data analysis available / needed, co-benefits, and suggested priority.

Public Transit

Invigorating public transport was priority one - for without an expanded, efficient, and equitable system the other key zero carbon actions could not easily occur. (See Action Item 3.2.1)

More people now patronize Ride On buses due largely to reorganized and expanded bus routes, more frequent service system-wide, and fare reductions including many free fares. In addition, a newly established fleet of small mostly autonomous and shared shuttles facilitate commuters/riders the last mile between the Metro or Purple Line and their

home, workplace or other destination. Ride On has grown from the 33rd to the 25th largest system in the US. with an expanded all electric fleet of right-sized buses serving every part of the county including service to Prince George and Howard Counties. (See Action Items 1.1.1; 1.1.2; 1.2.2)

The upper county Corridor Cities Transitway opened in the early 2020s and the 10 dedicated BRT lines were all in service by 2028. (See Action Items 1.1.6; 2.1.4)

Strikingly designed climate proof storage areas for bicycles and scooters, as well as sturdy and secure pedestrian waiting areas - all information and amenity rich - are features of every Metro, Purple Line, Corridor Cities Transitway, Ride On and BRT stops. (See Action Items 1.1.7; 2.1.6; 2.2.1)

School bus fleet size and mileage traveled were sharply reduced - as were student obesity rates - due to higher density development, a more extensive sidewalk network, roundabouts, safer roads, and a school siting and design policy that favored multistory buildings in developed areas connected to transit and services. (See Action Items 2.1.5; 5.1.6)

Electric Vehicles (EV)

Accelerating the retirement of internal combustion engine (ICE) vehicles, incentives for the purchase of electric vehicles, maximizing the shared use of electric vehicles, and convenient, clean energy infrastructure were the actions necessary to achieve near zero carbon emissions in our vehicles. (See Action Item 5.1.3)

The County in partnership with other jurisdictions and organizations successfully lobbied the state of Maryland and the US Congress to develop aggressive ICE (internal combustion engine) buyback programs. Those programs combined with higher taxes imposed on ICE vehicles were successful in helping to retire the 800,000 or so vehicles registered in the county, though at a very high cost. Special incentives were provided to car dealers to give priority to electric vehicle sales. (See Action Item 3.1.5)

To maximize resiliency and minimize dependence upon a grid powered in part by fossil fuels, Montgomery County created a network of solar microgrid-ready depots to charge its electric fleet. These depots were open to county residents when not in use. (See Action Item 2.2.1)

In cooperation with utilities and the private sector, the county created the largest charging network in the region. In developed areas of the county no vehicle is more than a few minutes away from a charger. Wireless charging is widespread as are charging systems embedded in roads. (See Action Item 3.1.2)

New construction and major retrofits now require EV charging infrastructure while direct energy from vehicle batteries to the grid is a critical tool for effective grid management.

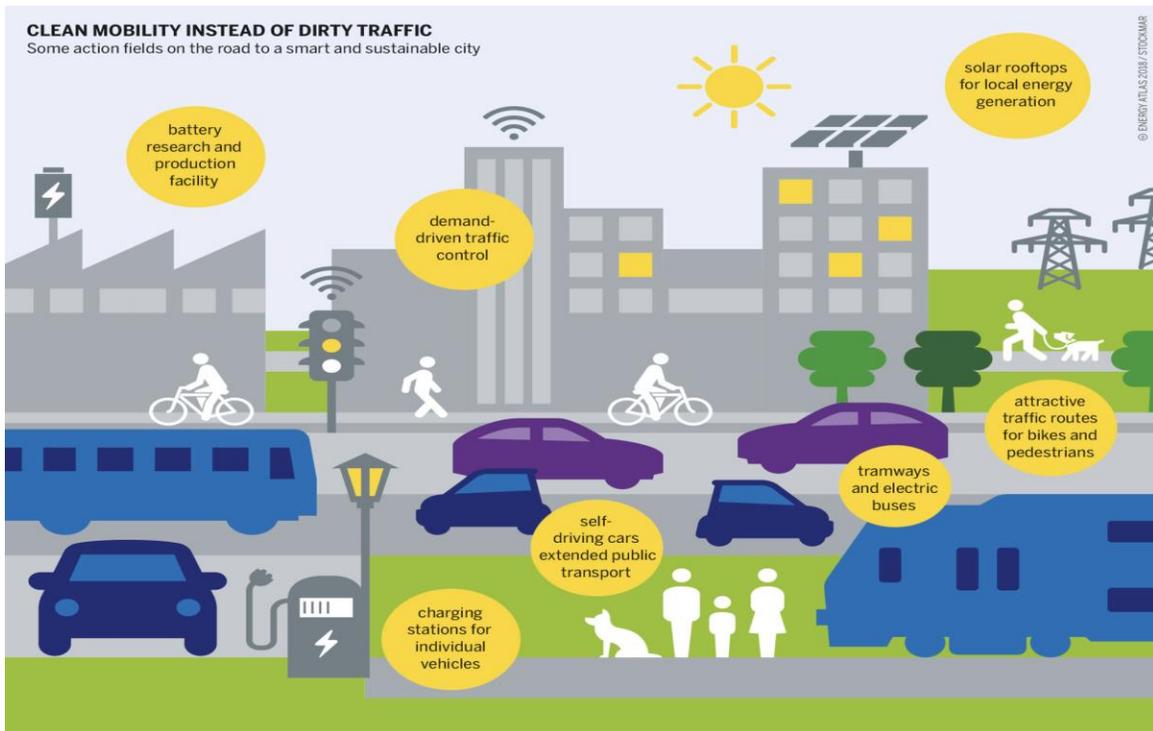
Vehicle sharing was supported by a county sponsored electric vehicle co-op. Commercial taxis and ride hailing services

were required to use electric vehicles and to give deeper discounts to individuals choosing shared vehicle options. Shared autonomous vans are moving millions of people a year by providing last mile services from Metro, the Purple Line, and many BRT and other bus routes. (See Action Item 3.1.4)

A successful campaign recruited local businesses to join the county in requiring that all commercial deliveries be made in Clean Emission Vehicles (CVO) only. As a result,

UPS, FedEx, Amazon and other delivery companies accelerated the transformation of their delivery fleet, including using e-cargo bikes, across the nation. (See Action Item 3.1.3; 5.1.1)

These and other accomplishments led the county to be recognized as among the most EV-friendly counties in the nation. Only a number of counties in California - which had a multi year head start - has had more EV success.



Infrastructure Transformation

Highway expansion projects have stopped and planned and proposed new highways have been cancelled. The resulting hundreds of millions of dollars saved were dedicated instead to extensive ‘road diets’ and complete street redesigns with priority for pedestrians,

bicyclists, shared vehicles, and dedicated public transport lanes for bus rapid transit (BRT). This policy helps protect the county’s landmark 93,000 acre Agricultural Reserve. (See Action Items 2.1.2; 3.2.2)

Street redesigns reduced automobile access and automobile use, which - complemented by vigorous enforcement, public education, and decongestion pricing led to a sharp and

sustained reduction in vehicle-related injuries and deaths, fulfilling the promise of the county's commitment to Vision Zero more than two decades earlier. (See Action Items 3.1.1; 3.1.2)

Telecommuting has vastly expanded, both to reduce GHG emissions and to ensure continuity on the increasingly frequent days when severe weather made commuting much more hazardous, if not impossible. (See Action Item 4.2.3)

Regulations now require all new multi-family housing and commercial development to limit parking spaces, reduce miles traveled in vehicles, and lessen GHG emissions by their occupants through sharply restricted or market-priced parking as well as subsidized bicycling, pedestrian and transit infrastructure. (See Action Items 2.2.2; 2.2.3; 2.2.4; 4.2.4; 5.1.5)

Roads have been rebuilt to accommodate the increased climate stresses of heat and intense rainfall. Lighter colored surfaces reflect sunlight and minimize heat buildup. The successful use of innovative low carbon paving materials for street construction and repair led to the adoption of these materials by governments throughout the country, preventing many million tons of CO₂ from being released into the atmosphere. (See Action Item 3.1.2)

The impact on transportation related GHGs that are generated outside the county has also been addressed including delivery curb control and curb pricing plans to increase efficiencies in public spaces. Business and

personal air travel has been sharply reduced due to the success of a Stay Local program that educated residents and businesses on the 'sky high' carbon emissions resulting from air travel. Concomitantly longer distance bus and train travel originating in the metro area greatly increased. (See Action Items 1.1.5; 3.1.3; 6.1.2)

Organizational & System Changes

This comprehensive transformation of how county residents travel could only be accomplished by systematic and aggressive efforts to educate and support the public, monitor, evaluate and quickly modify programs when necessary, and ensure that all current and proposed county regulations, budgets, investments and plans were consistent and supportive of the county's climate goals - an effort known as the climate test.

An equally important principle and program established early on by the county was known as the 'equity test'. Every major climate effort was designed with equity in mind - to ensure that no group be disadvantaged and that those less advantaged would be given full opportunity to participate. (See Action Item 5.1.7)

Even with aggressive programs, revamped traffic management and outreach initiatives the county recognized that achieving its targets would require comprehensive and substantial financial and programmatic support and partnership with state and federal agencies. (See Action Item 2.1.1)

To garner this essential support the county organized a broad coalition of cities and counties across the country to successfully lobby for changes in state and federal legislation and utility regulations. Legislation included:

- 2020 100% Eastern Regional (and 2025 Federal) Clean Energy Only (CEO) Electric Power Mandate
- 2022 75% Eastern Regional Transportation CEO Mandate Cap & Invest Program (Increased to 100% in 2027)
- Clean Energy Utility Selection (Community Choice Energy)
- Statewide Utility Bill surcharges which provided universal electric vehicle infrastructure
- Progressive, escalating carbon tax revenue. (See Action Item 6.1.1)

Public Awareness

Resident and employee awareness campaigns included labeling gas pumps with GHG information, incorporating climate emergency messaging at public events, and showcasing climate messages at every bus station, on every Ride On bus, and within every transit and ITS app among the dozens of other climate emergency awareness efforts undertaken by the county and its partners. These efforts were also spearheaded by various organizations including public institutions, schools, anchor employers,

religious, labor and other civic institutions. (See Action Items 5.1.8; 5.1.9))

Following IDEA (inclusion, diversity, equity and accessibility) principles and in partnership with businesses, non-profits, schools, civic and religious organizations, the county established a Community Climate Extension Service (CCES). (See Action Items 5.1.2; 5.1.4)

Modeled on the 100 + year old agricultural extension program, hundreds of volunteers were trained to help residents and businesses understand and access the many programs and services available to transform their homes, businesses, and lifestyles. Well over half of the county's households and businesses were assisted through the first fifteen years of the program. Inspired by Montgomery's example, millions nationwide have now been assisted by the national CCES network.

Affordable Housing

Transportation, climate change and housing were found to be intricately linked and inseparable topics. As a result, sufficient affordable housing was located adjacent to employment centers in order to cut down on commuting times and reduce vehicle miles traveled (VMT) as well as GHGs. In addition, an emphasis was placed on creating more regional employment and activity centers in upper county. (See Action Items 1.1.3; 4.1.1; 4.1.3; 4.2.1; 4.2.2)

The Many Benefits of This Sustainable Vision for a GHG Free County

This unprecedented zero carbon transformation not only met the county's greenhouse gas reduction goals, it also helped achieve the following *Quality of Life* benefits, including:

- **Resiliency:** Addressing transportation issues of [social vulnerability](#) increased the capacity of county communities to respond to events associated with climate change.
- **Decreased Congestion & Travel Time:** Residents live closer to their workplace, have more choice of travel options and contend with fewer vehicles on the road.
- **Community:** Increased transit equity, increased affordable housing, recreation and park space as a result of converting parking lots, and increases in transit and walking social interactions.
- **Safety:** Decreased vehicle-related deaths
- **Health:** Less asthma and obesity and reduced numbers of heart attacks, strokes and general ill health
- **Stormwater Management:** Increases in more permeable surfaces led to less stormwater runoff, less water pollution and less storm flooding

This remarkable transportation transformation was matched by an equally ambitious and integrated transformation of the county's building, waste, agriculture, manufacturing, and retail sectors as well as other emitters of GHGs towards zero carbon. Our accomplishment is a beacon to communities in every state and even on many continents. To commemorate Montgomery County's remarkable achievement the President of the United States rode up 16th St. from the White House on 'United States Bicycle One' (The Secret Service vetoed her wish to ride on United States Scooter One') to the Silver Spring Civic Center to present a special award to the 1,200,000 residents of the county for being the largest jurisdiction in the world to eliminate its greenhouse gases to help restore a safe climate for future generations.

Electric Vehicle/Alternative Fuel Subgroup: Findings of the Montgomery County Transport GHG Scenarios Analysis

Approach

The EV subgroup took a “broad and shallow” approach to researching and analyzing what would be needed to reach the County’s goals of an 80% reduction in greenhouse gases (GHG) by 2027 and a 100% reduction in GHG by 2035. We reviewed previous county, state, and regional reports to identify proposed actions that were already identified and considered. We looked at best practices in many other jurisdictions, as well as national programs, both current and past. We did preliminary research into industry innovation, and scoured news reports for new developments.

We then developed two products:

- A spreadsheet of recommended actions, as requested by the county, divided into separate sheets which discuss options for the various components of vehicle transformation planning (personal EVs, charging network, alternative vehicle types, transit and heavy-duty vehicles, county fleets, and other fleets, as well as recommended external advocacy)
- A spreadsheet to analyze the GHG emission reductions that would likely result from various combinations of increased EV sales, increased ICE retirements, and decreased VMT, and this summary document which describes what we have found through this analysis.

Recommendation summary

We developed a spreadsheet to address electric and alternative fuel transition in 7 categories:

- Personal EVs
- Charging Network
- Alternative Vehicle Types
- Transit
- Medium- and Heavy-Duty Vehicles
- Montgomery County Fleets
- Other Fleets
- Advocacy (noting that the county should use its influence with the state, region, and country)

The spreadsheet includes 28 objectives, 63 associated strategies, and 125 individual actions, which we then prioritized. The objectives and strategies are listed at the end of this document;

the entire spreadsheet, including the individual actions and prioritization, are submitted separately.

Sobering results

The EV subgroup created a qualitative spreadsheet using Google Sheets to help us see what kind of EV adoption, early ICE vehicle retirement, and/or VMT reductions might be needed to achieve the county's goal of an 80% GHG reduction by 2027. What we found was very sobering. If our spreadsheet analysis is correct, the county would be able to achieve the "80 by 27" (80% GHG reduction by 2027) in the county's transportation sector only with extraordinary measures that have not been seen before.

While electrification of passenger cars and a number of other vehicles are technologically feasible today, there are many other vehicles types (generally, those that require more power or have other specialized needs) that have not yet been demonstrated to be workable. Although it is likely that such technology will develop, we made the simplifying assumption that vehicles that are not ready to transition today would generally not transition until after 2027. Therefore, to reach the 2027 goal of 80% reduction of GHG, we aimed to reach 100% electrification where possible. This would allow the more challenging vehicle types, and other non-vehicular contributors of GHGs that cannot be totally controlled today, to make up the more difficult remaining 20% of emissions (which would need to be eliminated 2027-2035).

Using the simple spreadsheet tool we developed, the only way to achieve the "80 by 27" (80% GHG reduction by 2027) in the county's vehicles is if ALL of the following were to happen:

- 100% of all new and used MoCo vehicles sales must be EV (not hybrid) starting 2021
- The annual rate of ICE vehicle retirement must be tripled, beginning in 2021, with all retired vehicles being ICE vehicles and all retired vehicles being replaced by EVs, transit, or other electric transportation (this would lead to NO ICE automobiles, buses, and most light/medium duty commercial vehicles on the road by 2027)
- EVs produce zero GHG emissions (or, if the lifecycle emissions that are produced by EVs are left out of the Montgomery County calculations)

It would be extremely challenging for the county to achieve these transformative changes in society. Working alone (without the benefit of strong state, regional, and federal action), it is almost beyond comprehension. For example, we cannot conceive of how the county government on its own would get everyone in the county--individuals, private fleet owners, and government fleet owners--to only purchase EVs starting in 2021. This would also imply that, for vehicles where electric models are not yet available on a mass scale (e.g., minivans, certain types of

pickup trucks, certain types of SUVs), buyers would substitute with other electric vehicles or put off replacement. What policy tool does the county have to accomplish this?

To put these kinds of societal changes into context, we reviewed the experiences of other programs to date. After reviewing the literature on the impact of Cash for Clunker and related vehicle retirement programs, we have found little evidence that a municipality like MoCo could accelerate ICE vehicle retirements by 50%, let alone 200%. According to the [Congressional Research Service](#), the Obama Administration offered rebates between \$3500 and \$4500 per vehicle to boost vehicle fuel economy of up to 440,000 vehicles, spending \$3 billion between July 24, 2009 and August 24, 2009. If MoCo boosted ICE vehicle retirement by 50% through such an incentive causing about 200,000 ICE vehicles by 2027, it would cost the county between \$700 and \$930 million. For comparison, MoCo's 2020 operating budget was \$5.8 billion. This does not include the costs of other necessary improvements such as upgrading Montgomery County fleets and the installation of a charging network.

As another point of comparison, Los Angeles has recently launched an initiative to electrify vehicles in advance of the 2028 Olympic Games. Their goal is a 25% cut in GHG and a target "30% of L.A.-area personal passenger vehicles on the road (and 80% of new vehicles sold) being electric... Electric fueling infrastructure is key to hitting those goals, so the plan includes installing 84,000 public chargers".¹

If only some of these changes are made (say, if retirements increased by only 50% and VMT is reduced by 50% - still dramatic changes), this would only achieve about a 72% GHG reduction from passenger vehicles alone. And given how difficult it would be the county to reduce other transport sector emissions--aviation, construction equipment, heavy duty vehicles, etc.--we would expect net county transport GHG emissions reductions to be even less than 72%.

Even considering such a "scaled-down" approach, we do not think there is an example anywhere in the world where a municipality the size of MoCo achieved a 50% reduction in VMT in seven years even with the support of the federal or state/provincial governments. We cannot imagine a policy tool--TDM, urban planning, etc.--the county has to achieve such an unprecedented VMT reduction even with major policy action by the federal and state governments. And even if the federal and state governments took immediate and very aggressive action to encourage the purchase of EVs, a delay of a year or two in the implementation of such actions would probably put the "80 by 27" goal out of reach.

Finally, assuming that EVs emit zero GHG emissions is only credible if the electric grid somehow becomes 100% renewable or nuclear by 2027. Maryland's RPS (Renewable Portfolio

¹ <https://www.forbes.com/sites/alanohnsman/2019/11/26/la-has-an-olympic-sized-plan-to-cut-co2-and-supercharge-ev-use-ahead-of-2028-games/#196941237e7a>

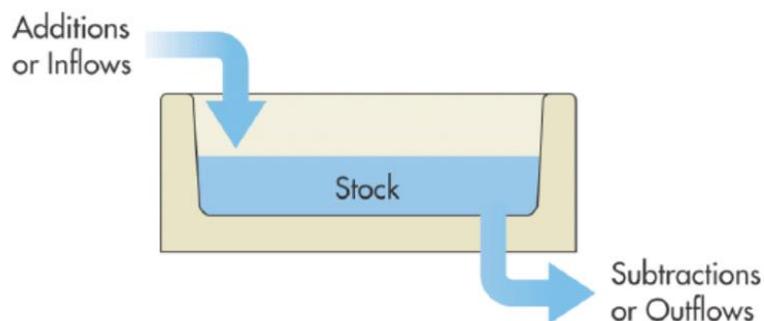
Standard) requires 45.5% of the state’s energy consumption to be renewable by 2027. Even assuming that all of the renewable energy is zero-carbon (which is not true today and is unlikely to be true by 2027 without significant state legislative changes), combining the 45.5% with the 34% of MD electricity coming from zero GHG nuclear energy yields just 79.5% zero GHG.

County achievement of these goals is likely possible only via a combination of major federal action, major state action, and/or major technical and societal breakthrough changes, coupled with a strong County commitment to force action.

Why such sobering preliminary findings?

These sobering results stem in part from the “stock and flows” issue. See the diagram below.

Stock is the name for the existing set of something, in this case the number of vehicles in use in the county. Flows is the name for the number of new items flowing into stock and the number of items leaving that stock. Like a bathtub filled with hot water, the “stock” of hot water will take a very long time to cool if a relatively small amount of cold water is flowing into the bathtub and a relatively small amount of the hot water in the bathtub is flowing out of the bathtub via the drain.



Likewise, the existing stock of approximately 800,000 mostly ICE vehicles in the MoCo stock will take a very long time to change over to become mostly EVs if the flow of new EV vehicles into the stock is relatively low and the flow of ICE vehicles leaving the stock is also relatively low.

The GHG emissions of passenger vehicles (LDV or Light Duty Vehicles) depends on types of vehicles in use--the stock--and miles traveled by those vehicles in the stock. Or to be a bit more technical, GHG emissions of passenger vehicles depends on the emissions per mile of all of the vehicles driving in MoCO times the number of miles traveled by these vehicles.

If there are 800,000 vehicles in use today in MoCo--the stock--and there are only about 60,000 new vehicles purchased in the MoCO each year--flowing in--and about 60,000 retired each year--flowing out--then it will take a very long time for that stock to turnover. Even if all the new vehicles flowing into that stock are EV and all of the retired vehicles are ICE, it will take about 14 years for all 800,000 to become EVs.

So, when could MoCo transport get to an 80% GHG reduction?

Using the crude spreadsheet we developed, we believe a nearly 80% GHG reduction might be possibly by 2040. This is based on the following aggressive but probably still realistic assumptions:

- 100% of new MoCo vehicles purchased are EV by 2035 (continued thru 2040)
 - scaled up from 1.1% in 2020
- 12% accelerated ICE vehicle retirement by 2030 (continued thru 2040)
 - scaled up gradually from 0% in 2020
- All vehicle retirements are ICE starting in 2021 (continued thru 2040)
 - all replaced by EV
- 15% VMT reduction by 2040
 - scaled up gradually from 0% in 2020

What kind of GHG reduction in MoCo transport achievable by 2027?

Using the crude spreadsheet we developed, we believe a 15% GHG reduction might be possibly by 2027 with a very aggressive set of policies and optimistic technology development (e.g., a large number and variety of EVs available within a few years). This is based on the following aggressive but probably still realistic assumptions:

- 50% of new MoCo vehicles purchased are EV by 2027
 - scaled up from 1.1% in 2020
- 10% accelerated ICE vehicle retirement by 2027
 - scaled up gradually from 0% in 2020
- All vehicle retirements are ICE
 - all replaced by EV
- 6% VMT reduction by 2027
 - scaled up gradually from 0% in 2020

Data and analysis issues

We used the most credible data we could find in our analysis including data from: California Air Resources Board, Congressional Research Service, MD DOT, U.S. Energy Information Administration, U.S. Department of Energy, Argonne National Laboratory, National Renewable Energy Laboratory, Edison Electric Institute, and other sources.

However, please note that there are a number of important simplifying assumptions in our analysis. The most significant of these are listed below, along with a note on whether the assumption is likely to lead to an overestimate or underestimate of remaining GHG emissions):

- No MoCo population growth (results in underestimate)
- No baseline VMT growth (results in underestimate)
- Each year, the baseline number of MoCo vehicles retired each year is equal to the number of new MoCo vehicles purchased each year (results in underestimate)
- The emissions per mile for EVs and ICE cars does not change over time (results in overestimate)
- Emissions factor for EVs is based on EVs with 200+ mile range (uncertain)

Many of the simplifying assumptions make our scenarios seem rosier than they would otherwise be. For example, a more sophisticated analysis would likely show significant baseline growth in vehicle miles traveled due to at least expected population growth in MoCo. That would make the results even more sobering.

Final thoughts

“A journey of a thousand miles begins with a single step.” - LaoTzu, 601-531 BCE

While our data shows that it will take longer than 2027 for transportation to reach an 80% reduction in greenhouse gas emissions, that should not be construed as intimidating or overwhelming. Rather, it we see it as a motivating conclusion that makes three things obvious. The first is the urgency of accelerating action now, precisely because of the challenges of marshalling this extent of societal change. The second is that every step to significantly lower carbon emissions is important, because we must slow, if not stop, additional carbon loading. And the third is that progressive jurisdictions like Montgomery County should play a leading role in modeling and demonstrating the feasibility of solutions for the rest of the state, country, and world.

It is clear that there is a strong need for the county to take urgent action in encouraging and getting ready for the inevitable tipping point that is almost upon us where gas-powered vehicles become a thing of the past. The county has an important role to play in preparing its community members to make this historic and important transition. Time is running short to have the necessary preparations in place as we make the shift to a new era of clean transportation.

Legislative actions at the federal and state level (including the regional Transportation Climate Initiative - TCI) could work in synergy with the actions included in our spreadsheet to influence the marketplace and quicken the uptake of EVs and the retirement of all gasoline vehicles. It is tempting to conclude that this could all be done more efficiently on a broader scale. That might be true, but we do not control the broader scale, and we do control the county's part. Strong and innovative solutions by the county could become the floor for climate planning elsewhere.